DMITRIYEV, Valentin Aleksandrovich, doktor tekhn.nauk, prof.;
DOLGOLENKO, Anatoliy Aleksandrovich, doktor tekhn.nauk, prof.; MARKOV, Vladimir Georgiyevich, kand.tekhn.nauk, dotsent; SMIRNOV, Sergey Aleksandrovich, kand.tekhn.nauk, dotsent; SIROTSKIY, V.F., doktor tekhn.nauk, prof., retsenzent; MAL'TSEV, V.N., kand.tekhn.nauk, dotsent, retsenzent; VORONKOVSKAYA, A.P., red.; VOLCHOK, K.M., tekhn. red.

[Theory of mechanisms and machines, machine parts and hoisting-conveying machinery] Teoriia mekhanizmov i mashin, detali mashin i pod"emno-transportnye mashiny. Leningrad, Izd-vo "Rechnoi transport," 1963. 580 p. (MIRA 16:6)
(Mechanical engineering) (Hoisting machinery) (Conveying machinery)

DMITRIYEV, V.A.

Dissolution potentials of aluminum in electrolytes for chemical polishing. Zhur. fiz. khim. 36 no.6:1375-1378 Je '62 (MIRA 17:7)

1. Kazanskiy filial AN SSSR, khimicheskiy institut.

S/0000/64/000/000/0497/0504

ACCESSION NR: AT4043091

AUTHOR: Dmitriyev, V. A., Belyayeva, Z. G.

TITLE: Chemical polishing of aluminum and alloy VD-17

SOURCE: Mezhvuzovskaya konferentsiya po anodnoy zashchite metallov ot korrozii. 1st, Kazan, 1961. Anodnaya zashchita metallov (Anodic protection of metals); doklady* konferentsii. Moscow, Izd-vo Mashinostroyeniye, 1964, 497-504

TOPIC TAGS: aluminum, alloy VD-17, aluminum electrolytic polishing, electrolyte composition effect, metal property effect, electrolytic polish quality, solution potential variation, nitric acid replenishment, oxide film, electrolytic polishing, surface finish

ABSTRACT: Sheet aluminum A1M and alloy VD-17 were polished in an electrolyte (96-98C) containing 780 ml phosphoric acid (sp. gr. 1.72), 70 ml sulfuric acid (sp. gr. 1.82), ml nitric acid (sp. gr. 1.51) and 10 g copper nitrate in order to evaluate the effects of electrolyte composition, process conditions and properties of the polished metal on finish quality. The latter was evaluated from surface brightness compared to that of a silver (100%). Results are presented on several graphs relating deformation level

ACCESSION NR: AT4043091

(0-42.5%, cold rolling), process duration (0-20 min.) and Al content in the electrolyte (0-80 g/l) to surface finish, as well as relating Al content in the electrolyte (0-3.0g per 100 ml) and duration (3-20 min.) to rate of stripping. It was found that the effectiveness of an electrolyte diminishes as the concentration of Al salts increses. Loss of polishing capacity is related primarily to rapid attrition of nitric acid, hence the latter was replenished periodically (5 ml/100 ml). Variation of the Al solution potential was continuously recorded and was related to finish quality, and the appearance of oscillations in the potentiometer record was found to indicate exhaustion of the solution. "O. A. Sukhoretskiy took part in the experimental work." The results demonstrate clearly the presence and significance of oxide films in these processes. Orig. art. has: 5 graphs and 1 table.

ASSOCIATION: none.

SUBMITTED: 13Mar64 ENCL: 00

SUB CODE: MM NO REF SOV: 000 OTHER: 004

Card 2/2

ACCESSION NR: AP4039405 S/0070/64/009/003/0418/0419

AUTHORS: Shalimova, K. V.; Andrushko, A. F.; Dmitriyev, V. A.; Pavlov, L. P.

TITLE: Crystal structure of CdS films deposited on glass and metal backing and further subjected to heat treatment

SOURCE: Kristallografiya, v. 9, no. 3, 1964, 418-419

TOPIC TAGS: sputtered film, metal backing, cadmium sulfide, cubic phase, hexagonal phase, annealing, heat treatment

ABSTRACT: The authors found that layers of CdS sputtered on films of gold exhibit inhomogeneous phases. With backing temperatures of 200-350C, both hexagonal and cubic phases were observed, whereas films deposited on glass showed the two modifications at temperatures only up to 250C. From this it seems obvious that the gold affects the phase composition. These films have mosaic structure of the two phases, with the cubic phase making up as much as 30%. The hexagonal crystals lie with the (0001) face parallel to the backing; the cubic crystals with the (111) face parallel to the backing. Samples heated above 350-400C have the hexagonal phase with no detectable orientation, differing from the relationship on glass backing. For short-period annealing (0.5-1 hr), structural changes occurred only on heating above

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ACCESSION NR: AP4039405

250-350C. The cubic phase was preserved up to 500C, but the amount declined appreciably. Prolonged heating, even at low temperatures (300C), caused disappearance of the cubic phase. Orig. art. has: 4 figures and 1 table.

ASSOCIATION: Moskovskiy energeticheskiy institut (Moscow Institute of Power Engineering)

SUBMITTED: 05Nov63 ENCL: 00

SUB CODE: EC, SS NO REF SOV: 004 OTHER: 003

Card 2/2

SHALIMOVA, K.V.; ANDRUSHKO, A.F.; DMITRIYEV, V.A.; PAVLOV, L.P.

Effect of the conditions of producing thin cadmium sulfide films on their crystalline structure. Kristalografiia 8 no.5:774-777 S-O '63. (MIRA 16:10)

1. Moskovskiy energeticheskiy institut.

DMITRIYEV, V.A.

USSR/Physical Chemistry - Electrochemistry, B-12

Abst Journal: Referat Zhur - Khimiya, No 19, 1956, 61169

Author: Vozdvizhenskiy, G. S., Dmitriyev, V. A., Rzhevskaya, Ye. V.

Institution: None

Title: Electrode Potentials of Copper Monocrystals in Phosphoric Acid

Original Periodical: Zh. fiz. khimii, 1955, 29, No 2, 280-286

Abstract: Investigated were the electrode potentials of Cu monocrystals (M) in H_3PO_4 (sp. gravity 1.53). M were grown by the method of crystallization from a melt. It is shown that static and especially dynamic potentials (the latter were measured with anodic polarization at current densities of 0.5-50 a/dm^2) of the facets of cube, octahedron and rhombododecahedron differ substantially from one another and the most positive potential is that of the facet of a rhombododecahedron (Vozdvizhenskiy, G. S., Dmitriyev, V. A., Dokl. AN SSSR, 1949, 66, 227). With increasing duration of the stay of M in the solution differences in static potentials gradually

Card 1/2

USSR/Physical Chemistry - Electrochemistry, B-12

Abst Journal: Referat Zhur - Khimiya, No 19, 1956, 61169

Abstract: decrease and after 270 minutes practically disappear whereas differences in dynamic potentials are retained. An explanation of the ascertained regularities is provided on the basis of the general theory of mutual influence of ion-atoms within the crystal lattice taking into account the distribution of electron density.

Kazanskiy Filial Akademii Nauk SSSR
Card 2/2 Khimicheskiy Inst. im. Akademika A.Ye. Arbuzova

DMITRIEV, V.

AID P - 3421

Subject : USSR/Chemistry

Card 1/1 Pub. 152 - 6/18

Authors : Vozdvizhenskiy, G. S., V. A. Dmitriyev, A. G. Mozhanova, Ye. V. Rzhevskaya, and D. Ye. Chasov

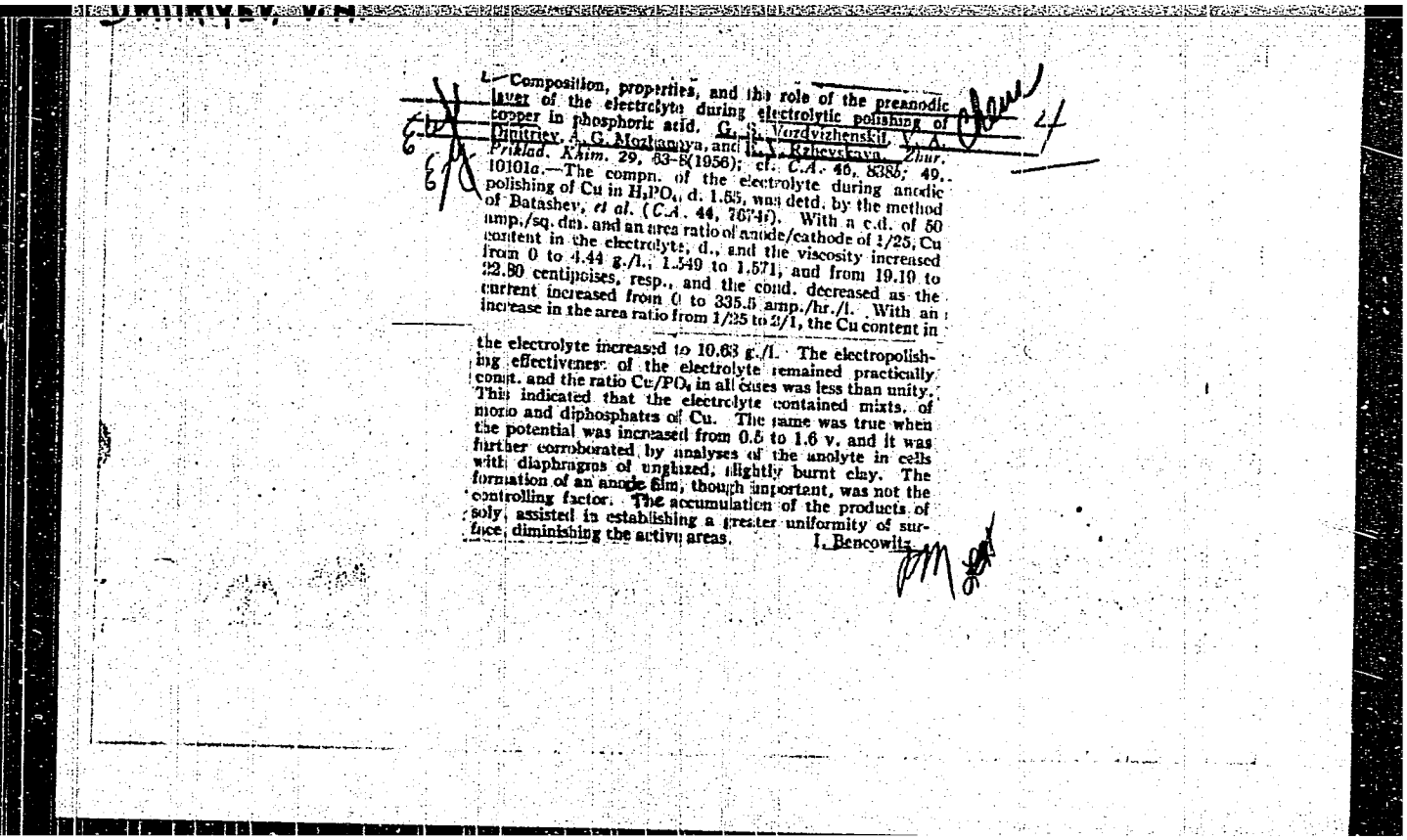
Title : Preparation of good-quality electrolytic coatings on articles from zinc alloys

Periodical : Zhur. prikl. khim., 28, 5, 484-489, 1955

Abstract : Various compositions and reaction conditions are described. Best results were obtained by using an electrolyte containing 20-25 g./L copper, 8-12 g./l. free cyanide, 15-30 g./L sodium cabonate; current density, 1 amp./sq.dm.; temp., 50-55°C; pH, 11-12; reaction time, 10 min. Three tables, 3 photos, 6 ref., 4 Russian (1943-1951).

Institution : None

Submitted : S 25, 1953



L—Composition, properties, and the role of the preanodic layer of the electrolyte during electrolytic polishing of copper in phosphoric acid. G. S. Vordvizhenskii, V. A. Dmitriev, A. G. Mozhaeva, and L. V. Rzhevskaya. *Zhur. Prikład. Khim.* 29, 63–8(1956); cf. *C.A.* 46, 8385; 49, 10101*a*.—The compn. of the electrolyte during anodic polishing of Cu in H_3PO_4, d. 1.55, was detd. by the method of Batashev, *et al.* (*C.A.* 44, 7674*f*). With a c.d. of 50 amp./sq. dm. and an area ratio of anode/cathode of 1/25, Cu content in the electrolyte, d., and the viscosity increased from 0 to 4.44 g./l., 1.549 to 1.571, and from 19.10 to 22.80 centipoises, resp., and the cond. decreased as the current increased from 0 to 335.5 amp./hr./l. With an increase in the area ratio from 1/25 to 2/1, the Cu content in the electrolyte increased to 10.63 g./l. The electropolishing effectiveness of the electrolyte remained practically const. and the ratio Cu/PO_4 in all cases was less than unity. This indicated that the electrolyte contained mixts. of mono and diphosphates of Cu. The same was true when the potential was increased from 0.5 to 1.6 v. and it was further corroborated by analyses of the anolyte in cells with diaphragms of unglazed, slightly burnt clay. The formation of an anode film, though important, was not the controlling factor. The accumulation of the products of soly. assisted in establishing a greater uniformity of surface, diminishing the active areas. I. Bencowitz

DMITRIYEV, V.A.

137-1957-12-24560

Translation from: Referativnyy zhurnal, Metallurgiya, 1957, Nr 12, p 230 (USSR)

AUTHORS: Dmitriyev, V. A., Rzhevskaya, Ye. V.

TITLE: On the Problem of the Mechanism of Electrolytic Polishing of Copper (K voprosu o mekhanizme elektroliticheskoy polirovki medi)

PERIODICAL: Izv. Kazansk. fil. AN SSSR. Ser. Khim. n., 1957, Nr 3, pp 105-109

ABSTRACT: The anodic yield of metal by the electric current was determined in the process of the anodic corrosion of specimens of tempered Cu in various concentrations of H_3PO_4. The yield of metal increased with decreasing concentration of the acid. When the D_a is 40 amp/dm^2 and the specific gravity of the H_3PO_4 is reduced from 1.62 to 1.21, the yield of metal increases from 25 to 97 percent. The Cu concentration in the electrolyte influences the yield of metal considerably. When D_a is 20 amp/dm^2, the yield of metal is almost 50 percent larger in an electrolyte containing 30 g/l of Cu, than it is in an electrolyte containing 87 g/l of Cu. At D_a = 50 amp/dm^2 the

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137-1957-12-24560

To the Problem of the Mechanism of Electrolytic Polishing of Copper

rate of corrosion (RC) is 2.3 times greater in H_3PO_4 with a specific gravity of 1.32 than it is in H_3PO_4 with a specific gravity of 1.53. The results obtained show that in the process of electropolishing, conditions must be created which favor the dissolving of the micro-projections, and at the same time ensure an identical RC for the various structural microconstituents; to achieve this it is imperative to ensure sufficient local inertness of the metal in order to suppress the action of the microelements. An electropolishing mechanism is examined which would provide identical RC for the various microconstituents of the surface of the metal.

Ya. L.

1. Electrolytic polishing Test results
2. Copper-Electrolytic polishing-

Card 2/2

DMITRIYEV, V.A.

137-1957-12-24611

Translation from: Referativnyy zhurnal, Metallurgiya, 1957, Nr 12, p 237 (USSR)

AUTHORS: Dmitriyev, V. A., Rzhevskaya, Ye. V.

TITLE: Some Problems of the Mechanism of Electrolytic and Chemical Polishing of Zinc (Nekotoryye voprosy mekhanisma elektroliticheskoy i khimicheskoy polirovki tsinka)

PERIODICAL: Izv. Kazansk. fil. AN SSSR, ser. khim. n., 1957, Nr 3, pp 111-118

ABSTRACT: By employing the electrolytic polishing of Zn as an illustration, it is demonstrated that the mechanism of the process is the same for metals with different properties, and that the mechanism of the process of chemical polishing of Zn does not differ from that of the electrolytic process. The anode potential was studied at various D_A's as a function of the concentration of the acid and the content of Zn in the electrolyte in the process of electrolytic polishing of Zn in H_3PO_4 (specific gravity 1.1 - 1.15). In another series of experiments the quality of an electropolished surface was studied as a function of the D_A and the concentration of acid and Zn in the electrolyte by observing the value of its reflective properties. A 500 ml electrolyzer was employed for the

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137-1957-12-24611

Some Problems of the Mechanism of Electrolytic and Chemical (cont.)

polishing of 20x10x10 mm specimens of cast Zn; one side of the specimen having an area of 1 cm^2, was subjected to electropolishing, while the remainder was protected. The surface of the anode was 20 times greater than the surface of the cathode. The polarization curves show a strong similarity to the curves of the electrolytic polishing of Cu in H_3PO_4. The discrepancy at small D_A's is caused by high chemical activity of Zn in the given electrolyte as compared with Cu. As in the case of the polishing of Cu, the maximum possible suppression of microelectrochemical corrosion of metal is a basic condition for the realization of the process. It was established that Zn can be polished chemically in concentrated HNO_3.

Ya. L.

1. Zinc-Electrolytic polishing-Test results 2. Zinc-Chemical polishing-Test results 3. Electrolytic polishing 4. Chemical polishing

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137-1957-12-24000

DMITRIYEV, V. A.

Translation from: Referativnyy zhurnal, Metallurgiya, 1957, Nr 12, p 237 (USSR)

AUTHORS: Avdeyeva, O. I., Vozdvizhenskiy, G. S., Dmitriyev, V. A.

TITLE: The Anodic Behavior of Aluminum in an Electropolishing Electrolyte (Anodnoye povedeniye alyuminiya v elektropolirovochnom elektrolite)

PERIODICAL: Izv. Kazansk. fil. AN SSSR, ser. khim. n., 1957, Nr 3, pp 119-123

ABSTRACT: For the purposes of studying the anodic behavior of Al in an electropolishing electrolyte, specimens were prepared from the A-00 grade of Al by rolling, annealing, and recrystallization; the samples obtained were large-grained with an average size of crystals being about 10 mm^2. The anodic corrosion of the specimens was carried out in an electrolyte composed of 65 percent of H_3PO_4, 17.5 percent CrO_3, and 17.5 percent H_2O at 80°C. The D_a was 0.1-90 amp/dm^2. The volume of the electrolyte was 1 liter, and the cathode was made of stainless steel. The ratio of the areas of the anodes and cathodes was 1:80 at $D_a > 0.1$ amp/dm^2, and 1:8 at $D_a = 0.1$ amp/dm^2. The quality of the surface was determined from its "reflectivity", along with the static potentials,

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The Anodic Behavior of Aluminum in an Electropolishing Electrolyte

their variations with time, and the anodic consumption of metal in the current. It is shown that structural changes in Al, which occurred in the cold rolling and during heat treatment, have an effect on all indices investigated. Texturing, which resulted from cold rolling, makes the metal more homogeneous physically, and this, in turn, produces a better leveling of the surface in the process of electropolishing. The greatest difference in the static potentials is observed in the first five to ten minutes. Specimens which had been polished with abrasive paper, exhibited an abrupt jump in E in the positive direction during the first ten minutes. This jump is absent in annealed samples which had not been finished, and is insignificant in rolled samples. When D_a is low (< 2 amp/dm^2, the anodic separation of metal as a function of the current exceeds 100 percent; the variation in the separation of metal with time during polarization indicates the presence of a self-dissolution process. The presence of a negative difference-effect, in the given condition, is apparently connected with the destruction of the protective Al film during the anodic polarization and with the possibility of the solution of Al in the form of ions of lower valence.

Ya. L.

Card 2/2

1. Aluminum-Electrolytic polishing-Test results 2. Electrolytic polishing

DMITRIYEV, V.A.

137-58-5-10838

Translation from: Referativnyy zhurnal, Metallurgiya, 1958. Nr 5, p 278 (USSR)

AUTHOR: Dmitriyev, V.A., Rzhevskaya, Ye.V., Khristoforov, V.A.

TITLE: The Structure of Electrolytically Polished Copper (Struktura elektropolirovannoy medi)

PERIODICAL: Izv. Kazansk. fil. AN SSSR. Ser. khim. n., 1957, Nr 4. pp 115-126

ABSTRACT: A study is made of the surface of Cu in the process of anodic dissolution in an electrolytic polishing bath in accordance with the process procedure and the crystallographic orientation. The experiments were run on annealed polycrystalline specimens of Cu and on single crystals of Cu obtained by crystallization from the melt. X-ray was used to determine the position of the crystallographic planes in the single crystals. Microscopic investigation of surfaces was performed with the optical portion of the PMT-3 instrument, at a magnification of 480 times. Investigation of the surface by the electron microscope was done with an EM-3 model, employing chrome-tinted celluloid replicas. The electrolyte used was H_3PO_4, of 1.535 sp. gr. The first stage process of electrolytic polishing of polycrystalline Cu at a

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137-58-5-10838

The Structure of Electrolytically Polished Copper

current density of 1 amp/dm^2 and 0.12 v effects an etching of the surface to reveal the microstructure. An increase in the current density, voltage, and duration of anodic dissolution is accompanied by a selective dissolution of various portions of the crystallite, confirming the concept of the electrical decrystallization mechanism of dissolution. As dissolution time is further increased, all signs of microstructure disappear, and the surface becomes microscopically smooth. Dissolution of individual planes of single crystals of Cu under a regime corresponding to the first segment of the polarization curve is accompanied by the appearance of etch figures appropriate to the given plane. Higher current densities result in a microscopically smooth, electrolytically polished surface similar to the surface of polycrystalline Cu. The use of electron microscope investigations with magnifications of the order of 2000 makes it possible to distinguish submicroscopic roughnesses on the "smooth" surface of the Cu. This roughness is due to the selective nature of the dissolution of sub-microscopic parts of the metal surface and is not related to crystallographic orientation.

1. Copper--Surfaces 2. Electrolytic polishing--Effectiveness E. K.

Card 2/2

5 (4)

AUTHORS: Vozdvizhenskiy, G. S., Dmitriyev, V. A., Avdeyeva, O. I. SOV/76-33-8-18/39

TITLE: Anodic Behavior of Aluminum in an Electropolishing Electrolyte at Small Polarizing Current Densities

PERIODICAL: Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 8, pp 1788 - 1790 (USSR)

ABSTRACT: In continuation of a previous paper (Refs 1,2) in which the anodic dissolution of metals in phosphorus-chromium electrolytes at low polarizing current densities was described, the present paper discusses the behavior of aluminum in the electropolishing electrolyte (EE) in the course of anodic decomposition of Al. The experiments were made with aluminum of the type ACO in the electrolyte H_3PO_4 65%, CrO_3 17.5%, H_2O 17.5% (Ref 5). The samples were made of polycrystalline metal as well as monocrystals (obtained by recrystallization). The anode- and cathode zones were separated by a porous diaphragm. In the anode space there was contained the above electrolyte, in the cathode space there was phosphoric acid (15.6 n). The measurement results of the metal yield (Table 1) show that the struc-

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ture of the sample surface had no effect upon the yield. It was observed that in the anode space Cr^{3+} ions were formed by the electrolysis (Table 2). By the anodic dissolution of aluminum in the (EE), a highly disperse dark-gray powder is formed on the shining metal surface. X-ray and electronographic investigations (carried out by Yu. I. Sozin and V. A. Khristoforov at the laboratoriya fiziko-khimicheskikh metodov issledovaniya (Laboratory of Physicochemical Investigation Methods) of the Institute mentioned under "Association") showed that the powder is highly disperse, crystalline aluminum the particles of which are covered with a thin hydroxide layer. It is assumed that in the anodic dissolution of Al in the (EE) a partial formation of ions of a lower valency takes place. The Al^{+} formed reduce Cr^{6+} to Cr^{3+} and transform themselves into the stable form of Al^{3+}; moreover, there is also the possibility of a disproportionation $3\ Al^{+} \longrightarrow Al^{3+} + 2\ Al$. There are 2 figures, 2 tables, and 5 references, 4 of which are Soviet.

Anodic Behavior of Aluminum in an Electropolishing Electrolyte at Small Polarizing Current Densities SOV/76-33-8-18/39

ASSOCIATION: Kazanskiy filial Akademii nauk SSSR, Khimicheskiy institut (Kazan' Branch of the Academy of Sciences, USSR, Chemical Institute)

SUBMITTED: January 27, 1958

Card 3/3

1.1110 also 1454, 1160

21903
S/117/61/000/005/006/009
A004/A104

AUTHOR: Dmitriyev, V. A.

TITLE: Chemical polishing of aluminum

PERIODICAL: Mashinostroitel', no. 5, 1961, 44

TEXT: The author points out that chemical polishing in contrast to electrolytical treatment does not require d-c sources and contacting fixtures. Parts of complex configuration of nearly any dimensions can be chemically polished. A chemically polished surface possesses a high corrosion resistance and fatique strength. A number of drawbacks connected with this process are enumerated: the short life of the majority of electrolytes, the impossibility of dimensional polishing and the difficulty of spent electrolyte recovery. Chemical polishing is effected at 90 - 98°C in an electrolyte composed of a mixture of phosphorous, sulfuric and nitric acid with small additions of cupric nitrate. The electrolyte for chemical polishing possesses only a limited in time polishing capacity, although its life may be increased by periodical correcting. The necessity of correcting the electrolyte generally arises after 1.5 - 2 grams aluminum have accumulated per 1 liter of electrolyte. After 6 - 10 corrections the electrolyte has to

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S/117/61/000/005/006/009
A004/A104

Chemical polishing of aluminum

be replaced. The author cites some figures as to thecorrection of electrolytes but points out that there are no universal magnitudes since the quantity and ratio of added constituents depends on the duration of polishing and on the configuration of parts. It is assumed that chemical polishing does not ensure a uniform and controllable metal removal since this depends on the duration of polishing, electrolyte life, mixing conditions, temperature and preliminary working of the metal. It has been, however, established that with the electrolyte being spent and aluminum accumulating the solution, the metal removal changes only insignificantly. The surface finish of parts after chemical polishing depends on the initial surface finish and the duration of polishing. Thus a five-minute duration of the polishing process with an initial surface finish of the 5th or 6th class will increase the final surface finish by one class, while a doubling of the polishing time will result in an increase of the final surface finish by two classes.

Card 2/2

DMITRIYEV, V.A.; RZHEVSKAYA, Ye.V.

Oscillatory process and mechanism of electrolytic polishing. Izv.-Kazan.fil. AN SSSR. Ser.khim.nauk no.6:163-170 '61. (MIRA 16:5)
(Electrolytic polishing)

AVDEYEVA, O.I.; DMITRIYEV, V.A.

Electrochemical behavior of aluminum in phosphoric acid solutions.
Izv.Kazan.fil. AN SSSR. Ser.khim.nauk no.6:171-175 '61. (MIRA 16:5)
(Electrodes, Aluminum) (Phosphoric acid)

DMITRIYEV, V.A.; AVDEYEVA, O.I.; SOZIN, Yu.I.

Problem of the formation of a disperse precipitate on an aluminum anode. Izv.Kazan.fil. AN SSSR. Ser.khim.nauk no.6:176-182 '61. (MIRA 16:5)

(Electrodes, Aluminum)

DMITRIYEV, V.A.; RZHEVSKAYA, Ye.V. (Kazan')

Periodic effects in the anodic dissolution of copper in phosphoric acid. Zhur. fiz. khim. 35 no. 4:871-878 Ap '61. (MIRA 14:5)

1. Kazanskiy filial AN SSSR, Khimicheskiy institut.
(Copper) (Phosphoric acid) (Electrolysis)

L 19386-63 EWP(q)/EWT(m)/EWP(B)/BDS AFFTC/ASD JD

ACCESSION NR: AT3001932 S/2912/62/000/000/0326/0332

AUTHORS: Dmitriyev, V.A.; Rzhevskaya, Ye.V.; Khristoforov, V.A. ADB

TITLE: The surface structure of metals and oxides after electrolytic and chemical polishing

SOURCE: Kristallizatsiya i fazovyye perekhody. Minsk, Izd-vo AN BSSR, 1962, 326-332

TOPIC TAGS: crystal, crystallization, crystallography, surface, structure, polishing, electrolytic, electrochemical, chemical, mechanical, electropolishing, anode, anodic, polarization, limiting current, potential, acceptor, activity, exhaustion, submicrostructure, oxide film, cuprous oxide, Cu

ABSTRACT: The paper describes the results of an experimental investigation of the surface structure created by electrolytic and chemical polishing of metals. A new approach to the problem is required, because the surface characteristics and the nonuniformities arising in the process of chemical polishing are basically at variance with the nonuniformities obtained in mechanical polishing. The surface structure of annealed Cu at various stages of anodic polarization in 70% phosphoric acid, performed in potentiostatic conditions, was employed. Specimens dissolved

Card 1/3

within 3 hrs. Ordinary etching and development of the microstructure in the 0.4-0.6-v potential interval. At 0.65-1.85 v, the so-called "plateau," a shining, visually smooth, surface is formed. 500x microscopic investigation, however, indicated far-reaching changes in the structure. Below the "oscillation potential," each grain has a smooth, polished, surface, but with pronounced grain boundaries. In the oscillation-potential interval 0.65-0.90 v a new-type structure with dissolution strata is formed. This structure depends on the orientation of the grains. At 1.2-1.6 v the grain-boundary development ceases, and at 1.65-1.75 v not only the intergrain boundaries but the dissolution strata themselves vanish. It is concluded that, contrary to prevailing opinion (Edwards, J., J. Electrochem. Soc., v. 100, no. 7, 1953, 189; no. 8, 1953, 223), the attainment of the limiting current, founded on the exhaustion of the activity of the acceptor H_3PO_4, is not a sufficient condition for the accomplishment of high-quality polishing, and the shape of the polarization curve is not adequate to characterize the polishing process. The reason for the inception of the manifold structure at various values of the potential, but at a constant limiting current, is evidently attributable to another process. It is postulated that an extremely thin layer of cuprous oxide forms on the surface of the Cu electrode. With increasing polarization potential, the character of the distribution of the cuprous oxide on the various crystallographic elements of the surface and its electrochemical nature changes. This, then, is the reason for the formation of

L 19386-63

ACCESSION NR: AT3001932

variously shaped structures at the limiting current. Only at elevated potential (1.65 to 1.75 v) will the cuprous-oxide film attain an elevated electrochemical uniformity, thereby forming a surface with a fine submicrorelief. In such conditions, the preferential dissolution of separate submicroregions of the surface will be determined fundamentally not by their electrochemical activity, but by the condition of the sufficiency of the acceptor. The experiments (numerous photos are shown) were performed on sheet-Cu specimens, on the surface of which a 0.2-mm thick cuprous-oxide film had been formed. It was found that electropolishing of cuprous oxide can be performed in the following electrolyte (in milliliters): H_3PO_4 (1.5 sp. gr.) 250; glycerol 150; T 40°C; current density 10-20 ma/cm^2. The cuprous oxide could be polished even more effectively by chemical dissolution in an electrolyte consisting of 135 ml H_3PO_4 (1.7 sp. gr.) and 15 ml HNO_3 (1.5 sp. gr.) at T 40-60°C. Orig. art. has 6 figs.

ASSOCIATION: none

SUBMITTED: 00 DATE ACQ: 16Apr63 ENCL: 00

SUB CODE: CH, PH, MA, EL NO REF SOV: 007 OTHER: 004

Card 3/3

GNOYEVOY, A.I.; SAVENKO, Yu.F.; DMITRIYEV, V.A.

Work practices of the V T.Shchebetovskii brigade in a longwall equipped with a USB-2 coal plow. Ugol' 40 no.3:6-10 Mr '65.
(MIRA 18:4)

1. Shakhta No.54 tresta Antratsit (for Gnoyevoy). 2. Kommunarskiy gornometallurgicheskiy institut (for Savenko, Dmitriyev).

L 39838-66 EWT(m)/FCC/T IJP(c) GD-2

ACC NR: AP6018853 SOURCE CODE: UR/0367/65/002/006/1075/1086

AUTHOR: Vernov, S. N.; Belyayeva, I. F.; Vedeneyev, O. V.; Dmitriyev, V. A.; Nechin, Yu. A.; Khristiansen, G. B.

ORG: Institute of Nuclear Physics, Moscow State University (Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta)

TITLE: Fluctuations of the energy fluxes of the nuclear-active and electron-photon components in extensive air showers [This paper was given at the 14th Annual Conference on Nuclear Spectroscopy, Tbilisi, February 1964]

SOURCE: Yadernaya fizika, v. 2, no. 6, 1965, 1075-1086

TOPIC TAGS: extensive air shower, electron, photon

ABSTRACT: Experimental data are given on the fluctuations of the energy flux of the nuclear-active and electron-photon components in extensive air showers and on the connections of these fluctuations with each other and with fluctuations of the age parameter s. It is shown that the bulk of these data disagrees with the model described by Nymmik and Shestoperov (Materials on the All-Union Conference, Apatites, 1964). The large role of the parameter s and other characteristics for the correct setting-up of experiments concerning extensive air-showers are discussed. Orig. art. has: 10 figures and 3 tables. [Based on authors' Eng. abst.] [JPRS]

SUB CODE: 03 / SUBM DATE: 23Apr65 / ORIG REF: 014 / OTH REF: 003

Card 1/1 hs

L 36396-66 EWT(m)/T/EWP(t)/ETI IJP(c) RDW/JD

ACC NR: AP6018784 (A) SOURCE CODE: UR/0070/66/011/003/0480/0483

AUTHOR: Shalimova, K. V.; Bulatov, O. S.; Voronkov, E. N.; Dmitriyev, V. A.

ORG: Moscow Power Engineering Institute (Moskovskiy energeticheskiy institut)

TITLE: Producing cadmium telluride films with a hexagonal structure

SOURCE: Kristallografiya, v. 11, no. 3, 1966, 480-483

TOPIC TAGS: cadmium telluride, vacuum sublimation, crystal orientation, temperature dependence, x ray photography, x ray diffraction analysis, cubic crystal, crystal growth

ABSTRACT: A study was made of the crystal modification of CdTe films prepared by vacuum sublimation in argon (10^{-1}-10^{-2} mm Hg) on glass substrates heated from 70° to 400°C. The original CdTe material was sublimated at 500° to 800°C and had a cubic modification. Some specimens were prepared by evaporating pure Cd and Te in the sublimation chamber. The crystal structures of the grown crystals were analyzed by x-ray diffraction and electron microscopy. In all cases, only crystals with cubic modifications were formed, the thinner films having (111) parallel to the substrate; by decreasing the substrate temperature and increasing the thickness, this orientation disappeared. When the original material was simultaneously evaporated with metallic Cd and Te, the structure became hexagonally modified. X-ray patterns of the cubic and hexagonally mo-

Card 1/2 UDC: 548.52 : 539.23

L 36396-66

ACC NR: AP6018784

dified crystals and a photograph of the CdTe hexagonal films are given. The amount and intensity of the hexagonal lines were related to the substrate temperature, speed of evaporation of the Cd and Te and the argon pressure. The greatest percentage of hexagonal phase was obtained at argon pressures of about 10^{-2} mm Hg. The interplanar distances and line intensities of the hexagonal CdTe crystals were tabulated for 22 different planes. The lattice parameters of hexagonal CdTe were determined: a=4.58 Å, c=7.50 Å and c/a=1.637. These data corresponded well with published results. Orig. art. has: 2 figures, 1 table.

SUB CODE: 20,11/ SUBM DATE: 03Jun65/ ORIG REF: 009/ OTH REF: 001

Card 2/2 mlp

DMITRIYEV, V.A.; SANIN, A.A.

Laboratory impulse oscillograph. Vest.Mosk.un. 8 no.6:95-102 Je '53.
(MLRA 6:10)

1. Fizicheskiy fakul'tet.

(Oscillograph)

DMITRIYEV, V.A.

PA - 2186

AUTHOR: DMITRIEV,V.A.

TITLE: On the Shape of the Electron Impulse in an Ionization Chamber. (Russian)

PERIODICAL: Zhurnal Tekhn.Fiz. 1957, Vol 27, Nr 1, pp 205-206 (U.S.S.R.)
Received: 2 / 1957 Reviewed: 3 / 1957

ABSTRACT: When computing radiotechnical recording devices it is necessary to know the shape of the electron impulse. The author computed the shape of the electron impulse in a cylindrical chamber in the presence of a positive voltage on the central electrode. In the course of calculations the theorem by RAMEAU-CHOCLET (SHOCKLEY ?) (these names are given here only in Cyrillic script) was used. The mobility of electrons, conditions otherwise being equal, is a function of the fieldstrength E, the shape of the function, however, is not accurately known. It may be assumed that in the case of small values of E/p the motion velocity of electrons in argon obeys the law

$v = kE^{1/2}$ where k does not depend on E. In any case the dependence of the motion velocity of the electrons on fieldstrength is less than in the case of ions. Velocity might even remain constant in the case of a modification of E within certain limits. Computations were carried out on the two assumptions

$v = kE^{1/2}$ and $v = v_o$. For either case expressions for the shape

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On the Shape of the Electron Impulse in an Ionization Chamber. (Russian)

of impulse in the case of homogeneous ionization (with respect to volume) are given. The shape of impulses is demonstrated by an attached diagram.
For the case $v = kE^{1/2}$ the modifications of the shape of the impulse are not essential compared to the case $v = v_0$. The impulses given in an attached drawing are described by the expression $A \ln(1/(1-\tau))$ for the case of a local ionization on the outer electrode. Here $\tau = v_0 t/b$ applies and b denotes the radius of the outer electrode. In the case of an exchange ionization the impulse is "essentially" concave. The point of curvature corresponds to the value $\tau \sim 0,8$ in the case of $b/a = 100$ and changes but little in the case of a modification of b/a. Here a denotes the radius of the inner electrode. The curvature of the impulse decreases with increasing b/a. In the case of an ionization along the diameter, the shape of the impulse is convex and also there the curvature decreases with increasing b/a. Such a modification of the shape of electrode impulse compared to the shape of the ion impulse is natural.

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On the Shape of the Electron Impulse in an Ionization Chamber. (Russian)

If it is assumed that the velocity of electrons (or ions) depends on fieldstrength as $v = kE^{\alpha}$, ΔN applies only in the case of $\alpha = 1$. This means constancy of mobility at arbitrary fieldstrengths which condition is satisfied also for ions. The velocity of electrons depends less on fieldstrength, wherefore $\Delta E > 0$ applies, i.e. the number of electrons will first increase in the region near the central electrode. Amperage then increases too, but it then begins to decrease since the total number of electrons in the chamber decreases. The curvature of the impulse is therefore at first always positive and then negative.

ASSOCIATION: Moscow State University
Physical Institute of the Academy of Science of the U.S.S.R.

PRESENTED BY:

SUBMITTED:

AVAILABLE: Library of Congress

Card 3/3

SOV/120-58-4-7/30

AUTHORS: Bekkerman, I.M., ~~Dmitriyev, V. A.~~, Molchanov, L. P., Khristiansen, G. B., Yarygin, P. I.

TITLE: Ionisation Chambers and an Apparatus for Studying Wide Atmospheric Cosmic Ray Showers (Ionizatsionnyye kamery i apparatura dlya issledovaniya shirokikh atmosfernykh livney kosmicheskikh luchey)

PERIODICAL: Pribory i tekhnika eksperimenta, 1958, Nr 4, pp 31-36 (USSR)

ABSTRACT: A description is given of ionisation chambers 60 litres in volume as well as various elements of the apparatus associated with them, such as pre-amplifier, amplitude analyser, etc. The chambers are made of stainless steel and are in the form of cylinders. The diameter of each cylinder is 250 mm. The cylinder forms the outer electrode. The diameter of the inner electrode, which is made of brass, is 4 mm. The length of the working part of each chamber is 1000 mm. The wall thickness is 2 mm. The pressure in each of the chambers is controlled by special manometers attached to them. The chambers are filled with very pure argon at a pressure of 5 atm. The EHT is applied to the central electrode through a 470 Meg resistor and the output pulse is taken off through a 390 puff capacitor. The capacitance

Ionisation Chambers and an Apparatus for Studying Wide Atmospheric Cosmic Ray Showers

of the entire chamber is 33 puff and the leakage resistance from the central electrode is 10^{12} ohm. A sectional drawing of the chamber is shown in Fig.2. In this figure 1 is the 390 puff capacitor, 2 is the left insulator, 3 is th chamber, 4 is the central electrode, 5 is the right insulator 6 is the 470 Meg resistor and 7 is the input valve. Fig.3 shows the characteristic curves of a typical chamber. The working region begins at 500 V. The working point actually chosen was at 1200 V. At that voltage the rise time of an electron pulse from the chamber is 30 μ sec. Each chamber is followed by a preamplifier of the type shown in Fig.4. This amplifier has a very low noise level and a wide region of linearity (10 μV to 1 V). The entire system consists of four such chambers in parallel, each of the chambers being followed by a preamplifier. Pulses from the outputs of the four preamplifiers are applied via coaxial cables to a linear adding device and then to a 4-stage amplifier. From the amplifiers the pulses are fed into 4 channels of a discriminator, all the channels being the same. The circuit of the discriminator is shown in full in Fig.6. It converts the

Ionisation Chambers and an Apparatus for Studying Wide Atmospheric Cosmic Ray Showers

measured signal into a signal whose duration is proportional to the amplitude of the measured signal (Refs 6 and 8). The apparatus will record pulses whose amplitudes differ by four orders of magnitude and the minimum pulse corresponds to the transit through a chamber of a single relativistic particle. There are 6 figures and 9 references, of which 4 are Soviet and the rest English.

ASSOCIATION: Zavod "Fizpribor" ("FIZPribor" factory)

SUBMITTED: October 11, 1957.

SOV/56-34-5-4/61

AUTHORS: Abrosimov, A. T., Goryunov, N. N., Dmitriyev, V. A., Solov'yeva, V. I., Ehrenov, B. A., Khristiansen, G. B.

TITLE: The Structure of the Extensive Atmospheric Showers at Sea Level (Struktura shirokikh atmosfernykh livney na urovne morya)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol. 34, Nr 5, pp. 1077-1089 (USSR)

ABSTRACT: This paper investigates the lateral distribution of electrons, nuclear active and nuclear passive particles in extensive air showers containing from 4.10^4 to 4.10^5 particles at sea level by means of correlated hodoscopes. These measurements were carried out from April to May of 1954 in Moscow. The authors used the hodoscopes K-6 of L. N. Korablev. At first the measuring device is discussed, which gave a sufficiently exact distribution of the density of the charged particles near the axis of any registered shower. By means of these data it is possible to determine the individual properties of the shower, - the position of its axis and the number of the particles. As zero approximation of the position of the

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axis the center of the region of maximal density of particle flux was taken. Also the determination of the second approximation is discussed in a few words, but the use of this second approximation is practically not necessary. The second characteristic of the shower - the total number N of the particles, was found after determining the position of the axis. Therefore the total number of the particles in the central region of the shower was used as a standard of the total number of particles. The experimental data concerning the spacial distribution of all charged particles may be approximated by the function $kNr^{-1}e^{-r}/R$ with R = (60 6) m for the region $2 \ll r \leqslant R(n-1)$ and by the exponential function $k_1 Nr^{-n}$ for the region $r \gg R(n-1)$ with $n=2,6 \pm 0,4$. The coefficients K and k_1 are found from the normalizing conditions of the function of spacial distribution. The hodoscopic device was also used for the determination of the number of the registered extensive showers with a fixed number N of particles. The energy flux of the shower is concentrated in a small region possessing a small radius of the order of several metres from the axis of the extensive air shower. The whole of the experimental facts may be explained by the idea of equilibrium

The Structure of the Extensive Atmospheric Showers at Sea Level SOV/56-34-5-4/61

between the electron component and the nuclear active component with low energies on one hand and by the energy-flux of the nuclear avalanche (lavina) of the shower core on the other hand. There are 7 figures, 4 tables, and 20 references, 12 of which are Soviet.

ASSOCIATION: Fizicheskiy institut im. P.N. Lebedeva Akademii nauk SSSR (Physics Institute imeni P.N. Lebedev, AS USSR)
Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: December 3, 1957

1.Particles(Airborne)--Measurement 2.Electrons--Distribution
3.Electrons--Properties 4.Mathematics--Applications

Card 3/3

9(6), 7(5) SOV/56-35-2-57/60

AUTHOR: Dmitriyev, V. A.

TITLE: The Transition Effect for Electrons in the Walls of a Ionization Chamber (Perekhodnyy effekt dlya elektronov v stenkakh ionizatsionnoy kamery)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 2(8), pp 553-554 (USSR)

ABSTRACT: The authors calculated the variations of the electron number by the transition of the electron-photon cascade from lead to the iron wall of the chamber. Calculations were carried out according to the formulae which are given in chapter 6 of a book of S. Z. Belen'kiy (Ref 2). But the calculations of this chapter 6 do not account the scattering of low energy electrons although this scattering changes essentially the effective range of such electrons. The author took account of this change according to chapter 7, § 27 of the above-mentioned book. In these calculations, the "equilibrium spectrum" of the electrons and the photon spectrum (with account of the dependence of the summary coefficient of the absorption of photons on the energies) were used. The above-

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The Transition Effect for Electrons in the Walls of a Ionization Chamber

mentioned calculations can be applied to a lead thickness which is equal to or greater than the depth of the cascade maximum t_{max}. A diagram shows the results of the calculations of the transition effect lead-iron. The sharp decrease of the number of the electrons for a little iron thickness is caused by the ionization stop of the electrons and may be explained by the softness of the energy spectrum in lead. An increase of the thickness of the chamber wall from [illegible] to 3 mm causes a difference of 8 % between the corresponding values of the transition effect. The author thanks G. B. Khristiansen for useful remarks. There are 1 figure and 3 references, 3 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: April 25, 1958

DMITRIYEV, V. A., Cand of Phys-Math Sci -- (diss) "Energetic Characteristics of Wide Atmospheric Clouds," Moscow, 1959, 9 pp (Mos State Univ im Lomonosov; Sci Res Institute ofNuclear Physics) (KL, 2-60, 110)

Dmitriyev, V. A.

SEA-LEVEL STUDIES OF THE HIGH-ENERGY NUCLEAR-ACTIVE COMPONENT OF EXTENSIVE AIR SHOWERS

S. N. Vernov, N. N. Goryunov, V. A. Dmitriyev, G. B. Kulikov, Yu. A. Nechin, G. B. Kristiansen

1. High-energy nuclear-active particles were detected by large bursts produced in ionization chambers by these nuclear-active particles during passage through a composite filter of lead and graphite. The use of a composite filter permits firstly, of separating, in the best possible fashion, the ionization produced in the chambers by the electron-photon component (which appears in the filter due to nuclear-active particles) from the ionization created by the electron-photon component of the shower coming from the air. On the other hand, the use of such a filter gives rise to a situation when the ionization in the chambers turns out to be proportional to the total energy transferred from the nuclear-active particle to the electron-photon component in the filter. So, the energy of a nuclear-active particle can be determined from the burst in the ionization chamber on the basis of rather general considerations.

Report presented at the International Cosmic Ray Conference, Moscow, 6-11 July 1959

31526
S/627/60/002/000/008/027
D299/D305

3,2410 (1559, 2205, 1705)

AUTHORS: Vernov, S. N., Goryunov, N. N., Dmitriyev, V. A., Kulikov, G. V., Nechin, Yu. A., Solov"yeva, V. I., Strugal'skiy, Z.S., and Khristiansen, G. B.

TITLE: Study of lateral-distribution function of charged particles and of the energy density of the electron-photon component of extensive air showers

SOURCE: International Conference on Cosmic Radiation. Moscow, 1959. Trudy. v. 2. Shirokiye atmosfernyye livni i kaskadnyye protsessy, 117-122

TEXT: The data obtained by means of the diffusion chamber and the hodoscoped counters permit determining the particle distribution in the neighborhood of the shower axis as well as at large distances from it. These data can be used for determining the number of particles and the position of the axis to an accuracy of approximately 1 m by means of the hodoscoped counters, and to an accuracy of several centimeters if the axis lies within the limits of the diffu-

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Study of lateral-distribution ...

sion chamber. The electron-photon component at large distances from the axis was studied by means of large ionization chambers, shielded with lead. During 1000 hours of operation, 28 cases were recorded of the axis (of showers with number of particles $N \geqslant 10^5$) passing through the core detector. All these showers were investigated in detail with respect to distribution and energy of particles. The cases most favorable for analysis are those, in which the shower axis lies in the diffusion chamber. In all, 7 such cases were recorded. For each of these showers, the lateral-distribution function of particle density was constructed for distances ranging from 5 cm to 1 m from the shower axis. It was found that the form of the distribution function varied from shower to shower in the core region. In that region, a peculiar feature of particle distribution was observed, namely a narrow beam (4 cm in diameter) of particles, consisting of a large number (4 to 15) of particles with collinear tracks. From data obtained by means of the hodoscoped counters and knowing the position of the shower axis, it is possible to construct the distribution function of charged particles up to a distance of r = 25 m. from the axis, for each individual

Study of lateral-distribution ...

shower. Then the experimental distribution functions were compared with the theoretical functions of Nishimura and Kamata. The results of the comparison are shown in a table. A difference was noted in the form of the distribution of the energy flux of the electron-photon component in the individual shower at a distance of $r \sim 1$ m, and at large distances from the axis; this is due to local fluctuations in the form of the energy distribution in the core. In each of the investigated showers, the energy flux of the electron-photon component was found within a radius of 25 m; it turned out that the electron-photon component energy-flux was stronger (on the average) in showers with small s, than in showers with large s (s being the "age parameter"). The system of counters permitted recording showers with number of particles $N = 10^4$ to 10^7. The data yielded by the diffusion chamber were used for constructing the distribution function for distances $r < 1$ m from the shower axis. The conclusion was reached that the form of the electron-photon energy distribution-function does not depend on the number of particles in the shower. Therefore, all the data were referred to a shower with same N, and the average energy-density distribu-

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tion constructed. Approximating this distribution by a power law of type r^{-n}, one obtains for the exponent n the following values (as a function of the distance r from the axis):

$n = 1,2 \pm 0,2, \quad 0,1 < r < 1$ m

$n = 1,5 \pm 0,2, \quad 1 < r < 10$ m

$n = 2,0 \pm 0,3, \quad 10 < r < 60$ m

$n = 2,6 \pm 0,2, \quad 60 < r < 1000$ m

Further, the mean energy per electron was obtained from experimental and theoretical values (based on the cascade shower theory) of the mean energy as a function of r showed a discrepancy which can be removed by taking into account the effect of nuclear scattering. The experimental values permit calculating the energy of the

Study of the lateral-distribution ...

electron-photon component, viz. $E_{eph} = 2.5 \beta N$, where β denotes the mean energy loss per unit of depth t. There are 2 figures, 1 table and 6 references: 5 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: J. Nishimura, K. Kamata. Suppl. Theor. Phys., no. 6, 1958.

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DMITRIYEV, V.A.

(8)

31519
S/627/60/002/000/001/027
D299/D304

3.2410(1559, 2205, 2705, 2805)

AUTHORS: Vernov, S. N., Khristiansen, G.B., Abrosimov, A. T., Goryunov, N. N., Dmitriyev, V. A., Kulikov, G. B., Nesnin, Yu. A., Sokolov, S. P. (deceased), Solov'yeva, V. I., Solov'yev, K. I., Strugals'kiy, Z. S., and Khrenov, B. A.

TITLE: General description of the setup used for studying extensive air showers and the provisional results obtained

SOURCE: International Conference on Cosmic Radiation. Moscow, 1959. Trudy. v. 2. Shirokiye atmosfernyye livni i kaskadnyye protessessy, 5-16

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TEXT: A complex experimental setup was installed at Moscow State University, consisting of a simultaneously operating physical apparatus plus the corresponding radiotechnical equipment and photographical recording devices. The setup incorporates over 5000 Geiger-Müller counters (forming a hodoscope), about 150 ionization

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General description of the setup...

chambers and a large diffusion chamber. The setup is designed for a comprehensive and simultaneous investigation of all the basic components (electrons and photons, nuclear-active particles and μ-mesons) of extensive air showers at sea level. The setup was designed in 2 different configurations: the first at the end of 1957, and the second at the beginning of 1959. Below, only the results obtained by means of the first setup are considered. The setup was located in a special building and in 10 mobile laboratories. The showers were registered by the system of hodoscoped counters. Part of the counters were shielded (those for detecting the nuclearactive particles and the μ-mesons) and the other counters were not shielded. The ionization chambers served to determine the lateral distribution of the electron-photon component and of the nuclearactive component. The microstructure of the electron component was studied by means of the diffusion chamber. Special measures were taken to ensure continuous and prolonged operation of the setup. The main units of the setup were automatically controlled, in particular the supply units and the photography system. The operation of the setup (as a whole) was controlled (triggered) by a selection system; in parti-

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cular, the showers were selected in accordance with the density of the electron flow and of the μ-mesons. The setup was in operation for about 2500 hours, yielding a large amount of experimental data which are still being processed. The probability theory (Baye's theorem) was used for determining the (x,y)-axes and the number of particles N of the shower; in addition the distribution function f(r) as well as other distribution functions were determined (r denoting distance). The values of x, y and N were found by means of a special electronic simulator. The density distribution of electrons and mesons was determined by means of formula

$$W(\rho) = \prod_i \left[1 - \exp(-\rho\sigma_i)\right]^{m_i} \cdot \exp\left[-\rho\sigma_i(n_i - m_i)\right]$$

where m_i is the number of counters which operate over an area σ_i, and n_i - the overall number of such counters. The energy E of the electron-photon component was determined by means of ionization

General description of the setup ...

chambers, shielded with lead (up to 6 cm thick). A very comprehensive picture of the particles and energies was obtained for showers whose axes fell within the system of 128 cubic detection chambers. The setup permits observing the central part of an atmospheric shower, whereby its several layers are simultaneously observed; this corresponds to the individual observation of the electron-photon, nuclearactive and μ-meson components. The processed material already yielded a fairly detailed picture of the structure of extensive air showers at sea level. Thus, the lateral distribution of particle flow in the individual showers was ascertained. It was found that the lateral distribution varies (in the 1 to 25 m range) from shower to shower; the average distribution is, in the range of 5 cm to 100 m, as follows:

$$\rho(r) = \begin{cases} \dfrac{K_1 N}{r^{0,6}} & K_1 = 3{,}3 \cdot 10^{-3},\ 0{,}05 < r < 0{,}3 \text{ m} \\ \end{cases}$$

(cont'd)

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General description of the setup ...

$$\left(\frac{K_2 N}{r} \cdot e^{-\frac{r}{60}} \right., \quad K_2 = 2 \cdot 10^{-3}, \quad 0{,}3 < r < 100 \text{ m}$$

The lateral distribution of the electron-photon components also fluctuates from shower to shower. At distances smaller than 1.5 m, these fluctuations are particularly sharp. The nuclearactive components also exhibits considerable energy fluctuations. The fluctuations in the high-energy μ-mesons were not yet analyzed. The energy of the electron-photon component E_{eph} was calculated for a shower with number of particles equal to $(2.7 \pm 0.2) \cdot N\beta$, where β is the critical energy for air (72 Mev). The above value was obtained with an accuracy of appr. 30%. It was found that the energy of the nuclearactive component $E_n \cong (0.5 \text{ to } 1.0) E_{eph}$. This value is, however, subject to considerable fluctuations and the experimental data are as yet insufficient to determine the contribution of the

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General description of the setup...

nuclearactive component in showers. In addition, the above-mentioned fluctuations severely delimit the choice of a theoretical model for the development of showers. Particular attention was devoted to the structure of the shower in the immediate vicinity of its axis, where the particles of highest (for the particular shower) energy should be concentrated. This led to the discovery of a new effect: Groups of particles (from 4 to 20) travel in narrow beams (not exceeding 8 cm in diameter) in the neighborhood of the axis (or along the axis itself), whereby their lateral distribution shows that the beams are not due to Poisson fluctuations. The new effect can be explained as follows: Either the beam is the core of a "young" electron-photon shower which originates from a high-energy π^0-meson at a certain distance from the apparatus, or the beam consists of μ-mesons. These two possibilities are discussed. The observed irregularity in the lateral distribution of μ-mesons in the vicinity of the shower axis might be related to the new effect. There are 6 figures and 2 tables.

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General description of the setup ... 31519 S/627/60/002/000/001/027 D299/D304

ASSOCIATION: Nauchno-issledovatl'skiy institut yadernoy fiziki MGU, Moskva (Scientific Research Institute of Nuclear Physics Moscow State University, Moscow)

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31527
S/627/60/002/000/009/027
D299/D305

3,2410(1559, 2705, 2805)

AUTHORS: Vernov, S. N., Goryunov, N. N., Dmitriyev, V. A., Kulikov, G. V., Nechin, Yu. A., and Khristiansen, G. B.

TITLE: Study of high-energy nuclearactive component of extensive air showers at sea level

SOURCE: International Conference on Cosmic Radiation. Moscow, 1959, Trudy. v. 2. Shirokiye atmosfernyye livni i kaskadnyye protsessy, 123-131

TEXT: The high-energy nuclearactive component was studied by the apparatus of Moscow State University. The nuclearactive component was detected and measured by means of hodoscoped counters and ionization chambers. The processed hodoscope data permitted determining the total number of particles N and the distance R_i of the shower axis from the ionization chambers. Part of the data were processed by the electronic computer of Moscow State University; thereby the number of particles was determined to an accuracy of approximately

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Study of high-energy ...

20%, and the position of the axis to within 0.25 m, provided it fell inside the area of a detector of 4 m^2. The joint processing of the data of the hodoscope and ionization chambers yielded the mean energy of the nuclearactive component of showers of various number of particles, the energy spectra of the nuclearactive particles in the central part of the shower, the lateral distribution of the energy flux carried by the nuclearactive component in the central part of the shower and the lateral distribution of the nuclearactive particles. Showers, whose axes were at a distance of less than 10 m from the detector of nuclearactive particles, were selected for further study. These showers were divided into 4 groups according to number of particles; over 1000 such showers were investigated. The integral spectra of nuclearactive particles of energies $E_{na} \leqslant 10^{12}$ ev. were obtained for the 4 groups. The integral spectra of nuclearactive particles, averaged over the showers of all the groups, can be approximated by an exponential function with exponent $\gamma = -1.0 \pm 0.2$. For showers with large N (group 4), the value of γ shows a decreasing tendency. The space distribution of the energy flux near the

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Study of high-energy ...

axis can be approximated by an exponential function with exponent $n = -1.5 + 0.2$. A typical correlation was established between the electron-photon and the nuclearactive components of cores of the individual showers, namely showers with an electron-photon component of an energy much higher than the average, have (as a rule) a nuclearactive component of lesser energy. The converse was also observed. The measurements gave direct evidence of the presence of nuclearactive particles of high-energy ($\sim 10^{12}$ ev.) in showers at sea level, and of the considerable importance of the nuclearactive component in the energy balance of the shower. The nuclearactive component in the central part of the shower carries an energy which is (on the average) almost as large as the entire energy of the electron-photon component at the level of observation. The presence of considerable energy in the nuclearactive component affects the absorption of particles in the shower. The development of individual showers can differ considerably, as the magnitude of the energy of the nuclearactive component differs considerably in the individual showers. The main contribution to the energy flux carried by the nu-

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Study of high-energy ...

clearactive component within a circle of given radius is made by high-energy particles, whose lateral distribution is such that, on the average, all the particles with energy $\geq 10^{12}$ ev. are contained in a circle of radius r = 1 m. The distribution of the energy flux carried by the nuclearactive component showed that this flux is fairly widely distributed. Further, the transverse momentum imparted to the particles (during their generation), was estimated. The nuclearactive component of showers with N = 10^4 to 10^6 at sea level carries an energy of 0.5 to 1.0 of the total energy, carried by the electron-photon component. As a result of the energy fluctuations of the nuclearactive component in the individual showers, the development of the showers fluctuates, too. The distribution of the energy flux of the nuclearactive component over a region of $1 \leqslant r \leqslant 20$ m near the axis is described by the law $r^{-2\pm0.25}$; such a distribution should affect the characteristics of the soft component. There are 4 figures, 1 table and 10 references: 9 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: J. Nishimura, K. Kamanta.Suppl. Prog.Phys.,no.6, 1958.

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21(7) SOV/56-36-3-16/71

AUTHORS: Abrosimov, A. T., Dmitriyev, V. A., Kulikov, G. V., Massal'skiy, Ye. I., Solov'yev, K. I., Khristiansen, G. B.

TITLE: The Nuclear-Active Component of High Energy in Extensive Atmospheric Showers at Sea Level (Yaderno-aktivnaya komponenta vysokoy energii v shirokikh atmosfernykh livnyakh na urovne morya)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 3, pp 751-761 (USSR)

ABSTRACT: In the present paper the authors report about statistical investigations of nuclear avalanches in extensive air showers at sea level by means of a sensitive detector. Measurements were carried out in 1957 by means of a device for combined investigations of extensive air showers which is now in operation at the MGU. It has 4 cylindrical pulse ionization chambers under a lead-graphite filter and 720 Geiger-Mueller (Geyger-Myuller) counters in hodoscope connection for the recording and energy determination of nuclear particles. The counters were connected in coincidence groups (total area 1320 cm^2), so that sixfold coinciding pulses were recorded. Figure 1 gives a rough outline of the device including its dimensions.

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The recorded and investigated showers are divided into 4 groups according to the particle number N:

1) $1.10^4 \leqslant N_1 < 3.10^4$; 2) $3.10^4 \leqslant N_2 < 1.10^5$;

3) $1.10^5 \leqslant N_3 < 3.10^5$; 4) $3.10^5 \leqslant N_4 < 2.10^6$.

For these 4 groups table 1 gives the number of particles with energies greater than one given, and also the maximum energy of the nuclear-active particle of individual groups. For the latter the following applies:

group	R	E^{max}_{nucl}	γ	(R = radius of the investigated shower range)
1	3m	$4.7.10^{12}$ev	1.8 ± 0.5	
2	4m	10^{13}ev	1.0 ± 0.2	
3	5m	$1.8.10^{13}$ev	0.9 ± 0.3	
4	6m	6.10^{13}ev	0.7 ± 0.3	

Figure 2 shows the course of the spectrum for the two extreme groups. Further investigations deal with the spatial distribution of the energy flux of the nuclear-active component;

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The Nuclear-Active Component of High Energy in Extensive Atmospheric Showers at Sea Level

figure 6 shows such a diagram for 4 shower groups with particle energies of 1.10^{11} - 3.10^{11} ev, 3.10^{11} - 1.10^{12}, $\geqslant 1.10^{12}$ and $E > 8.10^{11}$ ev. Figure 4 shows the course of energy flux density for N_1, N_2 and N_3, and figure 5 shows the distribution of the energy flux in a shower with $N = 2.10^5$. It was found that the energy of the nuclear-active component in some showers with equal N may differ considerably. Results are discussed, and in an appendix the energy distribution with respect to primary particles is investigated. The authors finally thank S. N. Vernov, G. T. Zatsepin for their help, valuable remarks, and discussions. They further thank G. V. Bogoslovskiy, V. I. Artemkin, and V. N. Sokolov for taking part in measurements. There are 6 figures, 2 tables, and 17 references, 15 of which are Soviet.

ASSOCIATION: Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta (Institute for Nuclear Physics of Moscow State University)

SUBMITTED: September 15, 1958

21(8) SOV/56-36-4-4/70

AUTHORS: Dmitriyev, V. A., Kulikov, G. V., Massal'skiy, Ye. I., Khristiansen, G. B.

TITLE: The Spatial Distribution of the Energy Flux of the Electron-Photon Component of Extensive Atmospheric Showers (Prostranstvennoye raspredeleniye potoka energii elektronno-fotonnoy komponenty shirokikh atmosfernykh livney)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 4, pp 992-1000 (USSR)

ABSTRACT: In the present paper the authors report on the results obtained by measurements carried out between June 1957 and February 1958 at sea level by means of a device for the complex investigation of extensive air showers. The device is at present in operation at MGU (Moscow State University). It is described in detail and is illustrated by figure 1 in form of a schematical drawing. The ionization chambers used had a diameter of 25 cm and a length of 1 m, the total area covered by them amounting to 3 m^2; they were filled with very pure argon, pressure 3 atm, and were enclosed on all sides by filters. The counters, each of 330, 100, and 18 cm^2, were arranged in groups of 24 and were

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The Spatial Distribution of the Energy Flux of the Electron-Photon Component of Extensive Atmospheric Showers

arranged in such a manner that they operated simultaneously within a range of distances of 1 - 50 m from the shower axis. A total of 2000 Geiger-Mueller counters in hodoscope connection (GK-7) was used. Showers with particle numbers of from 1.10^4 to 2.10^6 were investigated. The showers were divided into groups with the average particle numbers $< 1.10^4$, 2.10^4, $5.6.10^4$, 2.10^5, $5.7.10^5$ and $> 10^6$ for the 6 N_i-groups. For energy flux density it holds that $\varrho_E = n(t)\int_0^\infty \beta dt$ and for $t = 8$ $\varrho_E = \int_0^{t=8} n(t)\beta dt + \int_0^\infty \beta n(t=8)\exp(-\mu_t t)dt$ (Figure 2 shows the course of these curves for the N_4-group). n(t) denotes the particle number in dependence on the penetration depth t, and β denotes the average energy loss per t-unit. Figure 3 in semilogarithmic scale shows the course of energy flux density for the groups N_1 - N_5. Further diagrams show the dependence of electron-photon component energy on the distance from the shower axis r

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and on N. Further data concern investigations of the meson component. For $r < 6$ m it holds that

$N_\mu = 10^{-2} \int \frac{kN}{r} 2\pi r dr = 7.3 \cdot 10^{-4} N$, $(k = 2 \cdot 10^{-3}) \Delta E_\mu (< 6m) \sim$ $0.005\ E_{el\text{-}ph}^{\circ} (< 6m)$ for the share of the muon component in energy flux. For the electron-photon component the following holds for n: $n = -1.5 \pm 0.2$ at $1m < r < 8m$ and $n = -2.0 \pm 0.3$ at $10m < r < 50m$.

The spatial energy distribution function of this component does not depend on N for showers with the total particle number of $N = 10^4 - 10^6$. The spatial distribution of the energy fluxes in the central part of the shower agrees with the cascade theory calculations in the case of a cascade parameter s=1.2 being used. It was further found that with an increase of distance from the shower axis the energy flux of the electron-photon component decreases more slowly than the energy flux of the nuclear-active component. In a circle with the radius

The Spatial Distribution of the Energy Flux of the Electron-Photon Component of Extensive Atmospheric Showers

of 50 m about 75% of the total energy of the electron-photon component of the shower is contained. The authors finally thank S. N. Vernov and G. T. Zatsepin for their great help, I. P. Ivanenko for discussions, and V. I. Artemkin, L. A. Dikarev, V. N. Sokolov, K. I. Solov'yev, and D. S. Stel'makh for assisting in measurements and in the evaluation of data. There are 5 figures and 13 references, 9 of which are Soviet.

ASSOCIATION: Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta (Institute for Nuclear Physics of Moscow State University)

SUBMITTED: September 15, 1958

DMITRIYEV, V.A.; KULIKOV, G.V.; KHRISTIANSEN, G.B.

Investigation of high-energy nuclear-active particles at sea level. Zhur.eksp.i teor.fiz. 37 no.4:893-905 O '59.
(MIRA 13:5)

1. Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta.
(Cosmic rays)

VERNOV, S.N.; GORYUNOV, N.N.; DMITRIYEV, V.A.; KULIKOV,G.V.; NECHIN, Yu.A.; KHRISTIANSEN, G.B.

Function of the spatial distribution of a flux of charged particles in an individual extensive air shower. Zhur. eksp. i teor. fiz. 38 no.1:297-298 Jan '60. (MIRA 14:9)

1. Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta.

(Cosmic rays)

DMITRIYEV, V. A., KHRENOV, B. A., KHRISTIANSEN, G. B., VERNOV, S. N.,

Ghalam-Sadik, M., Khva, Ly-Don.

"On Mu-Meson Beams in EAS and the Investigation of Mu-Meson Spectrum."

report submitted for the Intl. Conf. on Cosmic Rays and Earth Storm (IUPAP) Kyoto, Japan 4-15 Sept. 1961.

DMITRIYEV, V. A., NECHIN, YU. A., KHRENOV, B. A., KULIKOV, G. U., SOLOVYEVA, V. I.,

KHRISTIANSEN, G. B., BELYAYEVA, J. F., ATRASHKEVICH, V. J., ABROSIMOV, A. T.

"The Structure of Extensive Air Showers at Sea Level."

report submitted for the Intl. Conf. on Cosmic Rays and Earth Storm (IUPAP)
Kyoto, Japan 4-15 Sept. 1961.

S/188/62/000/006/002/016
B191/B102

AUTHORS: Dmitriyeva, N. N., Dmitriyev, V. A.

TITLE: The distortion of an ionization burst spectrum effected by an amplifier

PERIODICAL: Moscow. Universitet. Vestnik. Seriya III. Fizika, astronomiya, no. 6, 1962, 7-10

TEXT: The distortion of pulses, i.e. the variation of the amplitude ratios, of a cylindrical ionization chamber was analyzed at various ionization distributions in the chamber. The case of an amplifier with broad pass-band (τ_1 = 10T, τ_2 = 1/5T) is investigated and some other cases, e.g. an amplifier with $\tau_1 = \tau_2 = T$, are discussed. T is the pulse duration, τ_1 and τ_2 are time constants of the most extreme differentiation and integration terms of the amplifier. The scattering and the magnitude of the output signals are compared for various values of τ_1, τ_2, T, and for various ionization distributions in the chamber. For $\tau_1 = \tau_2 = T$, the slope front

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increases by $\leqslant 10\%$ and the pulse-height resolution is found to be 3%. For $\tau_1 = \tau_2 > T$, a smaller scattering is, however, always accompanied by a considerable increase in the slope front (several 100%). A method of tuning band width noise, and magnitude of T for certain purposes (with consideration of microphony) is discussed. There are 2 figures and 1 table.

ASSOCIATION: Kafedra kosmicheskikh luchey (Department of Cosmic Radiation)

SUBMITTED: February 26, 1962

4

3,550

S/048/62/026/005/014/022
B102/B104

3,2410 (2205, 2705, 2805)

AUTHORS: Vernov, S. N., Khristiansen, G. B., Belyayeva, I. F., Dmitriyev, V. A., Kulikov, G. V., Nechin, Yu. A., Solov'yeva, V. I., and Khrenov, B. A.

TITLE: The primary cosmic-ray component at superhigh energies and some peculiarities of its interaction with nuclei of air atoms

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 26, no. 5, 1962, 651-657

TEXT: The paper is a report on experiments with the Moscow University large apparatus (area $4 \cdot 10^4$ m^2) for comprehensive studies of extensive air showers induced by high-energy cosmic particles. The charged-particle detectors (Geiger counters in hodoscope arrangement) cover an area of 110 m^2, the muon detectors (2-3 counter layers shielded with lead and iron, in hodoscope arrangement) more than 12 m^2, 6.3 m^2 of which are under

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S/048/62/026/005/014/022
B102/B104

40 m water equivalent. The nuclear-active-particle detectors form a system of 128 ionization chambers (8 m^2) shielded by lead and graphite filters. The number of muons produced in charged-pion decay was estimated (the pions were assumed to be formed in gamma-quantum photoeffect on nuclei of air atoms): $N_\mu^\pi(E) \leqslant \sigma_0 E_0/1.8(1-\alpha)E$, $\alpha \leqslant 0.5$, $\sigma_0 < 10^{-3}$; for $E_0 \approx 10^{16}$ ev and $E_\mu = 10^{10}$ ev ($\alpha = 0.5$), $N_\mu^\pi(10^{10}) \leqslant 10^3$. The number N_μ^n of muons in nuclear showers was measured. For showers with $N = 7 \cdot 10^6$ a mean number of $8 \cdot 10^4$ muons with $E \geqslant 10^{10}$ ev is to be expected. The spatial muon flux distribution was determined for these two types of showers (ρ_μ^n and ρ_μ^π). In the case of a simple model of air shower production (Suppl. Nuovo Cimento, 2, 649, 1958), an analysis of the experimental data yields $N = k_e E_0 \exp(-x+x_m+x_0)/\Lambda$; E_0 is the energy of the primary particle, x_0 is the depth of its first interaction, $x_m = B \log E_0$ (x - depth of observation), N is the total number of

S/048/62/026/005/014/022
B102/B104

The primary cosmic-ray component ...

shower particles; the number of muons $N_\mu = k_\mu E_0^\alpha$; $\Lambda = 200$ g/cm^2, $B = 30$ g/cm^2 and $\alpha = 0.8 \pm 0.1$. If the primary energy spectrum has the shape $AE_0^{-(\gamma+1)}dE_0$, at fixed N the N_μ distribution has the shape $N_\mu^{1/\alpha\left(\frac{\Lambda+B}{\lambda} - \gamma - 1\right)} dN_\mu$, λ being the mean free path with respect to interaction. Comparison between experiment and theory yields $\lambda = (85 \pm 5)$ g/cm^2, as an upper limit. For charged muons their energies (E_μ) and numbers (n_μ) were measured and calculated for several altitudes H; W is the probability for a charged pion produced at H decays without interacting with an air nucleus. The results indicate that in $\sim 3\%$ of all cases nuclear interaction is accompanied by a production of narrow beams of great numbers of charged pions. There are 8 figures.

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S/048/62/026/005/016/022
B108/B102

3.2410

AUTHORS: Vernov, S. N., Dmitriyev, V. A., Khristiansen, G. B., and Gulyam Sadyk Mukhibi

TITLE: Study of the high-energy muon spectrum at a depth of 40 m water equivalent

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 26, no. 5, 1962, 661-667

TEXT: The underground muon spectrum was studied with an array of ionization chambers (overall area, 1.75 m^2) with 48 Geiger-Müller counters (1.6 m^2) operating at energies from 10^{10} to 10^{13} ev. The muon spectrum was determined from the spectrum of showers induced by high-energy muons in the ionization chambers. The spectrum of the showers recorded, each of which involved ≥ 200 relativistic particles, could be approximated by an exponential law with the index $\gamma = -1.9 \pm 0.2$. In the case of showers with ≥ 2000 particles, $\gamma = -1.8 \pm 0.4$. The strongest showers involved more than 30,000 particles. The data obtained show that the muon-energy

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Study of the high-energy...

spectrum is uniform throughout the range of 10^{11} to 10^{13} ev. The constant exponent γ in this range is indicative of a more complex nature of muon production in the atmosphere than has hitherto been assumed. The production of muons by K-mesons, which would increase the exponent γ, is also considered. There are 3 figures.

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S/056/63/044/002/003/065
B102/B166

AUTHORS: Dmitriyev, V. A., Khristiansen, G. B.

TITLE: Investigation of the energy spectrum of high-energy muons at a depth of 40 m water equivalent in the ground

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 44, no. 2, 1963, 405-412

TEXT: In order to obtain information on the origin of high-energy muons, the authors measured the spectrum of extensive bursts induced by high-energy muons in the range from 10^{11} to $3 \cdot 10^{12}$ ev. The showers were generated in 16 cm thick lead filters arranged above two groups of ionization chambers (total area 1.75 m^2). The recording device provided with a pulse-height analyzer of 10% accuracy had a capacity of from 30 to 100,000 relativistic particles. The composition of the bursts is mainly determined by pion energy losses, i.e. by bremsstrahlung and particles arising in electromagnetic muon interactions and, to a lesser extent, also by nuclear interactions. The apparatus was in operation for 1200 hrs; the number of showers plotted against the number of relativistic particles per

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shower shows an exponential drop from n = 100 to n = 100,000 with a power of $\gamma = -1.9 \pm 0.2$. If the muon energy spectrum can be given by $\varphi(E_\mu)dE_\mu = AE_\mu^{-(\gamma+1)}dE_\mu$, then it is connected with the burst spectrum $b(\geq n) = B\gamma^{-1}(10^8 n)^{-\gamma}$, with $B \cong 9 \cdot 10^{-4}\ \gamma^{-2}$. The muon spectrum given by this relation is compared with calculations according to the Monte-Carlo method. Various corrections and the uncertainty induced by the error of γ were considered. The results are in relatively close agreement, and a comparison of the authors' results with those from other publications is also satisfactory, with the exception of the spectrum obtained by A. L. Rodgers (Proc. Phys. Soc. 78, 918, 1961) for $E_\mu > 100$ Bev. For $E > 10^{12}$ ev the results seem to be inconsistent with the present assumptions on muon production in $\pi^\pm$ or K decay. There are 6 figures and 3 tables.

ASSOCIATION: Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta (Institute of Nuclear Physics of the Moscow State University)

SUBMITTED: July 19, 1962

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S/056/63/044/002/027/065
B102/B186

AUTHORS: Vedeneyev, O. V., Dmitriyev, V. A., Khristiansen, G. B.

TITLE: Amplitude distribution of bursts produced by high-energy muons under thick filters

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 44, no. 2, 1963, 556-560

TEXT: The Monte Carlo method is used for calculating the amplitude distribution of monoenergetic muon bursts ($E_\mu = 10^{13}$ and 10^{14} ev) under one or several lead shields of 15 cm diameter. The bursts are assumed to be due only to pair production and bremsstrahlung in the filter. The contribution of nuclear interactions is ignored since it is at least one order of magnitude smaller than that of bremsstrahlung. The δ-electrons produced by muons can also be neglected if the shower contains many ($n > 10$) relativistic particles; the same is the case for electron-positron pairs of less than $6 \cdot 10^8$ ev since the muon energy losses amount to less than 2%. The muon energy is assumed to remain constant throughout the filter; this can be done since the total range of these high-energy muons

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Amplitude distribution of ...

($\sim 3 \cdot 10^5$ g/cm^2) is much larger than the thickness of the thickest filter (150 cm lead ~ 1700 g/cm^2). The probabilities for muon interactions per t-unit with losses $\geqslant 6 \cdot 10^8$ ev are 0.045 (10^{13} ev) and 0.090 (10^{14} ev); if only pair production is considered they are 0.044 and 0.089, respectively. The distributions were calculated from the data of 300 events and are shown in Figs. 2 and 3. There are 3 figures.

ASSOCIATION: Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta (Institute of Nuclear Physics of the Moscow State University)

SUBMITTED: July 12, 1962

Fig. 2. Amplitude distribution for $E_\mu = 10^{13}$ ev and 15 cm lead (= 33 t-units). Solid line: Pair production plus bremsstrahlung; dashed line: pair production alone.

Fig. 3. Amplitude distribution for $E_\mu = 10^{14}$ ev and 33 t-units (solid line) and 66 t-units (dashed line). Both pair production and bremsstrahlung are taken into account.

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Amplitude distribution of ...

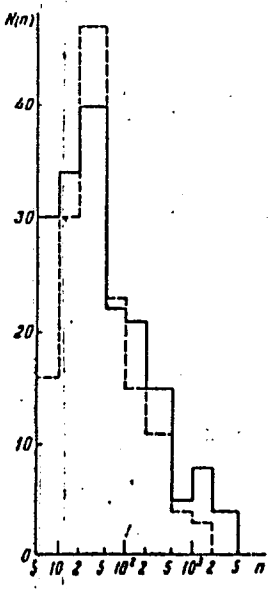

Fig. 2

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S/056/63/044/002/027/065
B102/B186

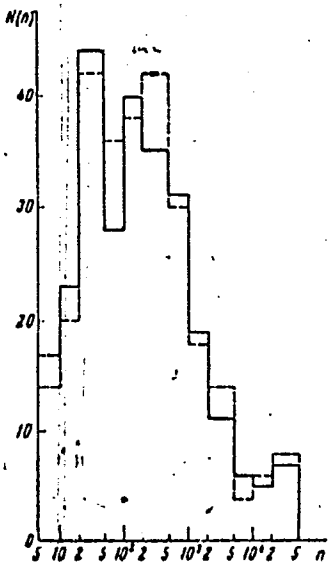

Fig. 3

VERNOV, S.N.; KHRISTIANSEN, G.B.; AHROSIMOV, A.T.; BELYAYEVA, I.F.; DMITRIYEV, V.A.; KULIKOV, G.V.; NECHIN, Yu.A.; SOLOV'YEVA, V.I.; KHRENOV, B.A.

Recent data on the study of extensive air showers by means of an elaborate setup. Izv. AN SSSR. Ser. fiz. 28 no.11:1886-1893 N '64. (MIRA 17:12)

1. Nauchno-issledovatel'skiy institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta.

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L 21189-65 EWG(1)/EWT(m)/FCC/T IJP(c) S/0048/64/028/012/2087/2092
ACCESSION NR: AP5002109

AUTHOR: Vernov,S.N.; Khristiansen,G.B.; Abrosimov,A.T.; Atrashkevich,V.B.; Belyayeva,I.F.; Vedeneyev,O.V.; Dmitriyev,V.A.

TITLE: Description of the modernized complex installation for study of extensive air showers (Report, All-Union Conference on the Physics of Cosmic Rays held in Moscow 4-10 Oct 1963)

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v.28, no.12, 1964, 2087-2092

TOPIC TAGS: cosmic ray measurement

ABSTRACT: During the past two years the installation for comprehensiv investigation of extensive air showers and high-energy muons has been greatly improved. The installation is located at Moscow State University and covers an area of about 4 hectares (about 10 acres); it consists of a large number of stationary and mobile "laboratories". The general layout is shown in the Figure (see Enclosure). In the mobile "laboratories" (Nos.7 through 16 in the figure) and in the stationary "laboratories" (1,2 & 3) in the main building the old system of hodoscopic counters has been supplemented by an array of 20 scintillation counters with an area of

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ACCESSION NR: AP5002109

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0.5 m^2 each, which make it possible to determine the strength of a shower and the orientation of its axis in space. In the underground laboratory the area of the muon detector has been increased from 6 to 45 m^2 and there has been installed a new system of 240 ionization chambers shielded by an absorber, intended for statistical measurements of the energy of muon fluxes. The paper gives diagrams of some of the counter and chamber arrays and describes some of the specific design features of the detectors and associated electronic equipment. A few typical curves are reproduced. The underground installation is characterized by an exceptionally large area, good continuity and a high resolution. Orig.art.has: 1 table and 9 figures.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 01

SUB CODE: AA NR REF SOV: 002 OTHER: 003

2/3

TOPIC TAGS: cosmic ray shower, nuclear particle, nuclear physics apparatus

ABSTRACT: Experiments are described that were conducted at Moscow State University on a complex apparatus for the study of broad atmospheric showers and the mu-meson component of cosmic rays. The apparatus gave simultaneous information on the electron-photon, mu-meson, and nuclear-active components of broad atmospheric showers in each individually recorded shower. Orig. art. has: 9 graphs, 3 tables.

ASSOCIATION: Nauchno-issledovatel'skiy institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta im. M. V. Lomonosova (Scientific Research Institute of Nuclear Physics, Moscow State University)

SUBMITTED: 00 ENCL: 00 SUB CODE: AA, NP
NO REF SOV: 003 OTHER: 006 JPRS

Card 1/1 nb

ACC NR: AP6035896 SOURCE CODE: UR/0413/66/000/020/0131/0131

INVENTOR: Gaynanov, A. G.; Dmitriyev, V. A.; Luginets, A. P.; Mikhaylova, K. K.; Panteleyev, V. L.; Smirnov, L. P.

YAKUBOV, L.S.; KRISHTAL', L.I.; DMITRIYEV, V.A.

[Principles of railroad statistics] Osnovy zheleznodorozhnoi statistiki. [Redaktory Krishtal', L.I., Dmitriev, V.A.] Moskva, Gos. transp. zhel-dor. izd-vo, 1953. 194 p. (MLRA 7:1)
(Railroads--Statistics)

TRUBIKHIN, Mikhail Georgiyevich; DMITRIYEV, Vasiliy Afanas'yevich; NEDOPSKIN, G.K., redaktor; KRISHTAL', L.I., redaktor; BOBROVA, Ye.N., tekhnicheskiy redaktor

[Calculating costs in railroad transportation] Kal'kuliatsiia sebestoimosti zheleznodorozhnykh perevozok. Moskva, Gos. transp. zheldor. izd-vo, 1956. 173 p. (MLRA 10:1)
(Railroads--Accounting)

DMITRIYEV, V.A., kand.ekon.nauk

"Selection of methods for increasing traffic capacity of railroad lines" by B.M.Maksimovich and others. Reviewed by V.A. Dmitriev. Zhel.dor.transp. 41 no.6:92-95 Je '59.
(MIRA 12:9)

(Railroads--Traffic) (Maksimovich, B.M.)

MIKHEYEV, A.P., prof., doktor tekhn. nauk; SHUKSTAL', Ya.V., kand. ekon. nauk; DMITRIYEV, V.A., kand. ekon. nauk; Prinimali uchastiye GUTKIN, L.V., kand. tekhn.nauk; SHVARTS, R.Ya., mladshiy nauchnyy sotr.; GORINOV, A.V., retsenzent; MIKHAL'TSEV, Ye.V., prof., retsenzent; GIBSHMAN, A.Ye., prof., retsenzent; RYLEYEV, G.S., inzh., retsenzent; KHACHATUROV, T.S., red.; MAKSIMOV, I.S., red.; GERASIMOVA, Ye.S., tekhn. red.

[Efficiency of electric and diesel traction in railroad transportation]Effektivnost' elektricheskoi i teplovoznoi tiagi na zheleznodorozhnom transporte. Pod red. T.S.Khachaturova i A.P.Mikheeva. Moskva, Gosplanizdat, 1960. 302 p. (MIRA 16:1)

1. Nauchnyye sotrudniki Otdela razvitiya tekhnicheskikh sredstv transporta i Otdela raspredeleniya perevozok mezhdu razlichnymi vidami transporta Instituta kompleksnykh transportnykh problem Akademii nauk SSSR (for Mikheyev, Shukstal', Dmitriyev). 2. Chlen-korrespondent Akademii nauk SSSR (for Gorinov, Khachaturov). (Electric railroads) (Diesel locomotives)

DMITRIYEV, V.A., kand.ekonom.nauk; MEKHOV, Ye.L., inzh.

Technical and economic efficiency of diesel locomotives with hydraulic transmission. Zhel.dor.transp. 42 no.6:37-41 Je '60. (MIRA 13:7)

(Diesle locomotives--Hydraulic drive)

DMITRIYEV, V.A., dotsent, kand. ekonom. nauk

Determining the efficiency of electrification in long-range planning. Zhel. dor. transp. 47 no. 11:71-75 N '65 (MIRA 19:1)

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 7, 1965, 125

TOPIC TAGS: railroad track, flaw detector, ultrasonic inspection

ABSTRACT: This Author Certificate presents an ultrasonic automatic flaw detector for inspecting rails laid in a track, containing a number of ultrasonic sets in the moving car with test heads located over various parts of the rail surface under investigation, a recorder for recording the flaw signals, and an electromagnetic device for marking with paint the defective sites on the rail surface. To expose cracks or any other defects in the region of bolt holes and to eliminate spurious signals when crossing welded joints in the rail, one of the ultrasonic heads is in the form of two identical probes placed perpendicular to the rail head surface along its axis at a distance greater than the width of the rail bolt hole (see Fig. 1 on the Enclosure). Orig. art. has: 1 diagram.

ASSOCIATION: none

Card 1/3

Card 2/3

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ACCESSION NR: AP5010142 ENCLOSURE: 01

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